R Notebook

```r
# import data
data1<-read.table("/Users/phamkhoa/Documents/university/3/stats_model_1/w6/tirereliability.txt", sep="\
attach(data1)
```

```r
# P1
#a
library(survival)
model.1a<-coxph(Surv(survival, complete)~wedge, data=data1)
coef(model.1a)
```

```
##    wedge
## -5.66496
```

```r
#b
newdata<-data.frame(wedge=c(0.6))
sf<-survfit(model.1a, newdata=newdata)
summary(sf, times=1)
```

```
## Call: survfit(formula = model.1a, newdata = newdata)
##
##  time n.risk n.event survival std.err lower 95% CI upper 95% CI
##     1     17       5    0.481   0.189        0.223            1
```

```r
#c
newdata<-data.frame(wedge=c(0.6,1.6))
risk<-predict(model.1a, newdata=newdata, type="risk")
risk[1]/risk[2]
```

```
##        1
## 288.5765
```

```r
#d
model.H1<-coxph(Surv(survival, complete)~wedge + peelForce + interBelt + wedge*peelForce, data=data1)
model.H0<-coxph(Surv(survival, complete)~peelForce + interBelt, data=data1)
anova(model.H0, model.H1)
```

```
## Analysis of Deviance Table
##  Cox model: response is  Surv(survival, complete)
##  Model 1: ~ peelForce + interBelt
##  Model 2: ~ wedge + peelForce + interBelt + wedge * peelForce
##    loglik  Chisq Df P(>|Chi|)
## 1 -23.987
## 2 -23.625 0.7225  2    0.6968
```

```r
#e
model.1e<-coxph(Surv(survival, complete)~wedge + peelForce + interBelt + wedge*peelForce, data=data1)
newdata<-data.frame(wedge=c(0.6), peelForce=c(0.8), interBelt=c(0.7))
sf<-survfit(model.1e, newdata=newdata,conf.type="plain")
summary(sf, times=1)
```

```
## Call: survfit(formula = model.1e, newdata = newdata, conf.type = "plain")
##
##  time n.risk n.event survival std.err lower 95% CI upper 95% CI
##     1     17       5    0.759   0.248        0.273            1
```

```r
summary(sf, times=1)$lower
```

```
## [1] 0.2729736
```

```r
summary(sf, times=1)$upper
```

```
## [1] 1
```

```r
# P2
#a
library(eha)
model.2a<-phreg(Surv(survival, complete)~wedge, data=data1, dist="weibull")

p<-exp(coef(model.2a)[3])
lambda<-exp(coef(model.2a)[2])
beta<-coef(model.2a)[1]
x<-c(0.6,1.6)
lambda.star<-lambda/exp((x*beta)/p)
# h(0.6)/h(1.6) = [lambda.star(1.6)/lambda.star(1.6)]^p
ratio<-(lambda.star[2]/lambda.star[1])^p
ratio
```

```
## log(shape)
##   528.2491
```

```r
#b
mu<-lambda.star[2]*gamma(1+(1/p))
mu
```

```
## log(shape)
##    1.80289
```

```r
# c
t.star<-rweibull(10000, shape=p, scale=lambda.star[2])
lowerbound<-quantile(t.star, c(0.1))
upperbound<-quantile(t.star, c(0.9))
lowerbound
```

```
##      10%
## 1.523373
```

```r
upperbound
```

```
##      90%
## 2.043925
```

```r
qweibull(0.1, shape=p, scale=lambda.star[2])
```

```
## [1] 1.525621
```

```r
qweibull(0.9, shape=p, scale=lambda.star[2])
```

```
## [1] 2.048305
```

```r
#e
model.2e<-phreg(Surv(survival, complete)~wedge + peelForce + interBelt + wedge*peelForce, data=data1, di

p<-exp(coef(model.2e)[6])
lambda<-exp(coef(model.2e)[5])
beta<-coef(model.2e)[1:4]
x<-c(0.6,0.8,0.7,0.6*0.8)
lambda.star<-lambda/exp(sum(x*beta)/p)

survival1<-1-pweibull(1,shape=p, scale=lambda.star)
survival1
```

```
## [1] 0.8017371
```